Kagawa, Masaharu and Kuroiwa, Chiharu and Uenishi, Kazuhiro and Mori, Miki and Dhaliwal, Satvinder (2007) A Comparison of Body Perceptions in Relation to Measured Body Composition in Young Japanese Males and Females. *Body Image* 4(4):pp. 372-380.

Title:

A comparison of body perceptions in relation to measured body composition in young Japanese males and females

Authors:

M. Kagawa, BSc(Hons), PhD[1, 2, 3], C. Kuroiwa, RPT, MSc[4], K. Uenishi, RD, PhD[5], M. Mori, RD, BSc[6], S. Dhaliwal, CertEd, CCD BSc(Hons) MSc[1], A. P. Hills, MSc PhD FASMF[2, 3], C. W. Binns, MBBS MPH PhD[1]

[1] School of Public Health, Curtin University of Technology, Australia

[2] ATN Centre for Metabolic Fitness, School of Human Movement Studies, Queensland University of Technology, Australia

[3] Institute of Health and Biomedical Innovation, Queensland University of Technology, Australia

[4] Department of Physical Therapy, Koriyama Institute of Health Science, Japan

[5] Department of Physiological Nutrition, Kagawa Nutrition University, Japan

[6] Department of Administrative Dietetics, Kagawa Nutrition University, Japan

Address for Correspondence:

Masaharu Kagawa

ATN Centre for Metabolic Fitness, School of Human Movement Studies, Institute of Health and Biomedical Innovation, Queensland University of Technology, 60 Musk Avenue, Kelvin Grove QLD 4059 Australia

Contacts: (Telephone) +61-7-3138-6091; (Facsimile) +61-7-3138-6030;

(E-mail) m.kagawa@qut.edu.au

Running title: BODY PERCEPTIONS IN RELATION TO MEASURED BODY COMPOSITION

Abstract

The body composition of 139 Japanese females and 84 Japanese males (aged 18-30 years) was measured using anthropometry to assess gender differences in body perceptions in relation to their measured values. Participants were asked to rate perceptions of their own "heaviness" and "fatness" and these were compared to their BMI and percent body fat (%BF). Japanese females showed a significantly greater desire to lose body weight (-4.20 ± 0.6kg) compared to males (0.27 ± 1.4kg). Females also showed poor understanding of their "heaviness" and "fatness" in relation to actual body composition compared to males. The results confirmed distinct gender differences in body perception in relation to actual body composition and attitudes to weight management. Further promotion of "healthy" body image is recommended for the Japanese population.

Key words: Body perception; Japanese; anthropometry; percentage body fat; gender

A comparison of body perceptions in relation to measured body composition in young Japanese males and females

Introduction

In the past few decades the "ideal female physique" has been consistently thin in western societies (Garner, Gerfinkel, Schwartz, & Thompson, 1980; Katzmarzyk & Davis, 2001; Wiseman, Gray, Mosimann, & Ahrens, 1992). The same trend is present in countries under strong western influence such as Japan. In comparison to many western societies where average body mass index (BMI; weight (kg)/height $(m)^2$) has been continuously increasing, the BMI of young Japanese females aged 15-24 years has declined from 21.5 in 1960 to 20.5 in 1995 (Kiriike, Nagata, Sirata, & Yamamoto, 1998). A study of 30,903 young Japanese females (aged 15-29 years) reported changes in BMI per 10-year period between 1976 and 2000 as -0.17 for the 15-19 age group, -0.22 for the 20-24 age group and -0.34 for the 25-29 age group, respectively (Takimoto, Yoshiike, Kaneda, & Yoshita, 2004). A recent National Nutrition Survey in Japan (NNS-J) also reported a dramatic increase in the proportion of young females (aged 20-29 years) who were classified as underweight (BMI below 18.5). While the proportion of 'underweight' males increased from 6.1% in 1982 to 8.1% in 2002, the proportion of 'underweight' females increased from 11.4% to 26% during the same period (Kenkou Eiyou Jouhou Kenkyukai (The Society for the Study of Health), 2004).

Previous studies reported that a large proportion of young Japanese females overestimated their current BMI and expressed their desire to lose weight (Hayashi, Takimoto, Yoshita, & Yoshiike, 2006; Sotoyama et al., 2000; Takahashi et al., 2002). However, a limited number of studies have reported accuracy of body perception in Japanese females. This is because many available studies, including the National Nutrition Survey (Kenkou Eiyou Jouhou Kenkyukai (The Society for the Study of Health), 2004), have used BMI as an indicator of fatness (Miyagi, 1998; Takahashi et al., 2002; Tanaka, Ito, & Hattori,

2002; Yakura, Hiroe, & Kasagi, 1993). The BMI has been acknowledged as a simple and convenient anthropometric index to assess health status in an epidemiological setting. However the BMI cannot differentiate body composition of individuals (Garn, Leonard, & Hawthorne, 1986; Ross, Crawford, Kerr, & Ward, 1988) and therefore is inappropriate as a reference for self-perceived "fatness". Additionally, many previous studies have used different BMI cut-off points to those proposed by the World Health Organisation (WHO) (2004) or the Japan Society for the Study of Obesity (JASSO) (Matsuzawa et al., 2000). This lack of standard reference criteria makes it very difficult to compare and interpret findings.

Furthermore, there is also a lack of research on body perception of young Japanese males. Using 230 male university students, Urata et al. (2001) reported that approximately 40% of Japanese males with "acceptable" BMI or %BF perceived themselves as overweight and about 20% perceived themselves as underweight. A recent cross-ethnic study also showed that Japanese males are likely to overestimate themselves compared to their Australian counterparts (Kagawa, Kerr, Dhaliwal, & Binns, 2006). These results may indicate that compared to western males, Japanese males may overestimate themselves as seen in females. A previous study that compared body perception of university students (110 males and 79 females) suggested that both genders showed a poor understanding of body fatness and it is likely that they estimate their body fatness using their body weight (Tanaka et al., 2002). However this finding has not been confirmed and further research is required.

Poor body perception may lead individuals to disordered eating behaviours and further preoccupation with thinness, including eating disorders, menstrual and hormonal dysfunctions (Rock, Gorenflo, Drewnowski, & Demitrack, 1996), a reduced bone density (Van Loan & Keim, 2000) and also a depletion of muscle mass from possible attempts to lose weight without adequate physical activity (Garrow & Summerbell, 1995; Kajioka, Tsuzuku, Shimokata, & Sato, 2002). In order to prevent these health problems, it is important to

understand gender differences in body perception and plan strategies for its improvement. The aim of the current study was to compare body perceptions of "heaviness" and "fatness" of young Japanese males and females using actual BMI and %BF as objective measures of "heaviness" and "fatness", respectively.

Methods

Participants

A dataset of 139 Japanese female (JF) volunteers recruited at Kagawa Nutrition University in Saitama prefecture and a dataset of 84 Japanese males (JM) volunteers recruited at University of Hyogo in Hyogo prefecture were used. Kagawa Nutrition University is located in Sakado-city (population: approximately 100,000; area: 40.97km^2) and the University of Hyogo is located in Himeji-city (population: approximately 500,000; area: 534.27km^2). Both cities are approximately one hour from major urban areas, Tokyo and Kobe. At each university participants were recruited through class visits and distribution of flyers that sought volunteers for an international collaborative health study. Inclusion criteria for the study included being a Japanese citizen aged between 18 and 30 years of age with no health problems requiring lifestyle modifications (including medications and dietary restrictions). There were a couple of university staff members in the female group whereas all male participants were students. The study was approved by the Human Research Ethics Committee of Curtin University of Technology (Australia) and the Ethics Committee of Kagawa Nutrition University (Japan). The study adhered to the principles of medical research established by the National Health and Medical Research Council (NHMRC, 1999), including the completion of a consent form prior to measurement.

Data collection

Participants who read and completed a consent form were asked to complete (1) a questionnaire and (2) anthropometric measurements. In order to remove bias associated with knowing their actual body weight, all participants completed the questionnaire before undertaking anthropometric measurements.

The questionnaire addressed participants' perceived current height and weight, an ideal weight for their perceived height, and also their perceived "heaviness" and "fatness". A "perceived" BMI was calculated using their perceived height and weight and an "ideal" BMI was calculated using the reported ideal weight with measured current height. A question on perceived "heaviness" had six choices including (1) very light, (2) lighter than average, (3) about average, (4) heavier than average, (5) very heavy, and (6) I don't know. Similarly, six choices were available for a question on perceived "fatness": (1) have very small amount of body fat, (2) have small amount of body fat, (3) about average, (4) have large amount of body fat, (5) have very large amount of body fat, and (6) I don't know. Responses were grouped into three categories (1) light/less fat, (2) average, and (3) heavy/fat, according to the question (ie., "heaviness" or "fatness"). In addition, participants were asked about their effort to maintain or achieve their perceived ideal weight using questions like "*Do you eat three meals a day?*", "*Do you eat breakfast regularly?*", "*Are you aware of the amount and the content of the food you are eating everyday?*", and "*How many times a week have you participated in vigorous exercise that makes you sweat in the past four weeks?*". Questions used in the study were adopted and modified from the NNS-J (Kenkou Eiyou Jouhou Kenkyukai (The Society for the Study of Health), 2004).

Anthropometric measurements included height, weight, eight skinfolds (triceps, subscapular, biceps, iliac crest, supraspinale, abdominal, front thigh, medial calf), five girth (arm [relaxed], arm [flexed and tensed], waist, gluteal, maximum calf), and four bone breadths (biacromiale, biiliocristale, biepicondylar humerus, biepicondylar femur).

Measurements were taken according to the standard methods proposed by the International Society for the Advancement of Kinanthropometry (ISAK) (2001). Anatomical landmarks of participants were marked by an ISAK level three (instructor level) anthropometrist (MK) and all measurements were conducted by anthropometrists accredited by ISAK. The intra- and inter-tester technical error of measurements (TEM) were determined from measurements of 20 participants and a comparison with the instructor anthropometrist using three participants respectively prior to their participation in the study. The calculated TEM of anthropometrists were within the acceptable limits reported elsewhere (Gore et al., 1996).

%BF was estimated by first calculating body density using gender-specific Durnin and Womersley equations (1974) and then converting the body density value into %BF using Siri's equation (1961) (%BF = (4.95/Body density - 4.50)*100). In addition, the BMI, sum of eight skinfolds and height-corrected sum of eight skinfolds (sum of skinfolds*(170.18/ height)), were calculated from anthropometric measurements.

Actual levels of "heaviness" and "fatness" of participants were determined using the BMI and %BF. Using the classification approach proposed by the Regional Office for the Western Pacific Region of WHO (WPRO), three categories of BMI were used in both groups:

- below 18.5kg/m^2,
- 18.5-22.9kg/m^2, and
- equal or greater than 23kg/m^2 (WHO/IASO/IOTF, 2000).

The cut-off point of 23 was used in this study as it has been proposed as a level to take appropriate public action to decrease health risks for Asians (WHO, 2004). Use of the cut-off has been supported by previous studies assessing health risks and its relationship with measured body composition (Deurenberg, Yap, & van Staveren, 1998; Kagawa, Kerr, Uchida, & Binns, 2006; Weng et al., 2006). For %BF classification, the categories of below 10%, 10-

19.9%, and equal or above 20% were used for males. In comparison to males, %BF cut-off points of below 20%, 20-22.9%, and equal or greater than 30% were used for females. The cut-off points were based on the previous recommendations made in both Japan and Western countries (Huenemann, Hampton, Shapiro, & Behnke, 1966; Nagamine, 1972; Wilmore, Buskirk, DiGirolamo, & Lohman, 1986).

Data analysis

Statistical analyses were conducted using the SPSS (version 14.00) and the SAS (version 8) statistical packages. Gender differences in body composition and perceived current and ideal body weights were analysed using paired and independent t-tests and chi-square tests with a significance level of 0.05. Differences in behaviours to maintain or achieve ideal weight were compared using chi-square tests. Participants' perceptions about own "heaviness" and "fatness" in relation to the values from body composition measurement were assessed using the weighted Kappa method.

Results

Females were significantly smaller in body size and had higher values for both %BF and sum of skinfolds compared to males as shown in Table 1. No gender differences in BMI values were observed. A significant proportion of females were trying to maintain or to achieve their ideal weight than males (JF: 60%, JM: 39%; $p<0.05$). A significantly ($p<0.05$) greater proportion of females were aware of the amount and the contents of food they consumed (79%) than males (38%) but a smaller proportion were physically active compared to males (JF: 33%, JM: 86%).

Both males and females showed high correlations between their perceived and measured height and weight values (intraclass correlation ranged between 0.90-0.99), and males showed significant (p<0.05) overestimation of current body weight (-0.35 ± 0.3kg) (Table 2). However, there was no gender difference in discrepancy between measured and perceived body weight (JF: -0.26 ± 0.2kg). An overestimation of 350g in males may have no clinical significance and therefore the results suggest that both Japanese males and females have a good understanding of their height and weight. On the other hand, there were distinct gender differences in perceived ideal weight in relation to perceived current weight. Females expressed a desire to lose an average of 4.2kg whereas males preferred a weight gain of about 300g on average. This equates with a reduction of about 1.8kg/m^2 in BMI value for females compared to a 0.1kg/m^2 gain for males.

Table 3 presents body perceptions regarding “heaviness” and “fatness” in relation to BMI and %BF obtained from anthropometry. All males in the study with a BMI below 18.5 perceived themselves as light, but only 57% of females of the same category perceived themselves correctly. In addition, 38% and 4.8% of females whose BMI was below 18.5 perceived themselves as “average” and “heavy”, respectively. Further, 59% of females with a BMI within the average range (ie., 18.5-22.9 using the WPRO classification) perceived themselves as “heavy” and only 31% of these individuals perceived themselves correctly to be average. For males with average BMI values, about 43% perceived themselves correctly and 41% underestimated their actual heaviness. An overestimation in females and underestimation in males can be also observed from their perceived “fatness” using %BF as an indicator. The majority of females in the study with low levels of body fat (ie., below 20%) perceived themselves as “having an average amount of body fat” and about 8% of the group reported having “a large amount of body fat”. Similarly, only 37% of females with an

acceptable level of %BF (ie., 20-29.9%) perceived themselves correctly and 61% perceived themselves as “fat”. In males, there was a tendency to underestimate their level of fatness. Approximately 20% of males perceived themselves as “average” despite having a considerable amount of body fat (ie., equal or greater than 20%).

In order to determine gender differences in body perception in relation to measured values the weighted Kappa method was used. Females showed poor agreements in both perceptions about “heaviness” and “fatness” compared to males. In addition, while males showed a better understanding of their “heaviness” (0.53) than their perceived “fatness” (0.35), females showed no differences in level of agreement (“heaviness” = 0.31; “fatness” = 0.29, both categorised as “fair agreement”). These results suggest that Japanese females have a poorer understanding of their actual weight or fatness compared to males.

Discussion

Using the BMI and %BF classifications that are commonly employed to assess health status, the current study identified striking gender differences in body perception. Japanese females displayed a considerable discrepancy between their current and ideal physiques compared to males. In addition, the study indicated that Japanese females have a poor understanding of their weight and body fat levels relative to the medical definitions to maintain their health.

Average height and weight of both groups in the current study were comparable to the reported values in a recent NNS-J (Kenkou Eiyou Jouhou Kenkyukai (The Society for the Study of Health), 2004) and the anthropometric database for Japanese (JARD, 2002). This may indicate that the physique of the participants is representative of the general population of the same age group. In the current study both males and females showed accurate

perceptions about their height and weight (and therefore the BMI) compared to the measured values. This finding was in contrast to statements in a recent review of 34 studies (including one Japanese study) that females underestimated their current body weight (Engstrom, Paterson, Doherty, Trabulsi, & Speer, 2003). Rather, the current findings support the statement by Nakamura et al. (1999) and indicate that young Japanese adults are generally well aware of their body size.

The BMIs of the study population were comparable to the proposed ideal BMI value for Japanese adults for lowest morbidity and mortality risks from obesity-related health problems (ie., 22kg/m^2) (Kanazawa et al., 2002). Despite this, females in the current study reported that they wanted to lose more weight. This finding supports a previous result based on a total of 18, 512 university students from 22 countries that Asian females consistently perceive themselves as overweight compared to females living in Mediterranean countries (Wardle, Haase, & Steptoe, 2006). Another study suggested a greater body dissatisfaction in Japanese females compared with their Taiwanese counterparts (Shih & Kubo, 2005), indicating that Japanese females may have strong body dissatisfaction with weight and body shape compared with other Asian females and those living in western countries, even though they are at a satisfactory level to maintain their health.

Together with their dissatisfaction toward body weight, females also perceived their "fatness" poorly when the common health and medical definition of %BF was used. A comparable level of agreement in perceived "fatness" and "heaviness" in females may indicate that Japanese females use body weight to estimate their fatness. This result supports the findings of Tanaka et al. (2002) that Japanese are likely to estimate their body fatness from their weight relative to height. The importance of weight in the perception of one's own "fatness" is in contrast to studies in western societies that have suggested that frame size is an

important variable in females' body perception (Davis, Durnin, Dionne, & Gurevich, 1994; Page & Fox, 1998).

In comparison to females, Japanese males showed a moderate agreement in perceived "heaviness" in relation to their BMI. The result was consistent with the 2002 NNS-J results on perceived fatness using BMI as an indicator (Kenkou Eiyou Jouhou Kenkyukai (The Society for the Study of Health), 2004). Considering an accurate perception about their current weight and also clinically non-significant difference between "ideal" and "perceived" weights, Japanese males appear to have a good understanding of their weight in relation to the medical definition of "heaviness".

On the other hand, as seen in females, males showed a low level of agreement in "fatness". However the present study showed a distinct gender difference in body perception that, even though there were males who overestimated their level of fatness, a certain proportion of males underestimated their level of fatness. A tendency of underestimation by males has been reported in previous studies using the BMI (Blokstra, Burns, & Seidell, 1999; Donath, 2000). The observed underestimation in "fatness" may be due to a misunderstanding about actual body composition (ie., lean and fat mass) as suggested by Cash and Hicks (1990). In addition, those who overestimated their levels of "heaviness" and "fatness" may have been associated with both a misunderstanding of body composition and the "ideal" male physique preferred by Japanese females. A previous study suggested that Japanese females prefer the thin, unisexual-figure as the "ideal" male image (Takeda, Suzuki, & Muramatsu, 1996). Whilst a recent study has suggested a lower body dissatisfaction among Asian (ie., Taiwanese) males compared to western males (Yang, Gray, & Pope, 2005), the current findings may indicate that Japanese males have greater body dissatisfaction compared to males of other ethnic groups due to their cultural and social backgrounds.

The present study showed a striking gender difference in body perception in relation to measured body composition. In an earlier study, Brodie and Slade (1988) stated that accuracy in body perception does not associate with measures of fatness. The current study partly supports this statement as both genders were unable to estimate their level of "fatness" despite having a good understanding of their body size. At the same time, the study showed the likelihood that Japanese females use their weight as an indication of "heaviness" and "fatness" that is not necessarily based on the medical definition of overweight and obesity. The considerable overestimation in females suggests they have strict definitions of "heaviness" and "fatness" which may be due to a lack of appropriate knowledge in the area but also underlines the potentially strong influence of social and cultural factors. Previous studies have suggested that young Japanese females value "beauty" above "health" or "well-being" compared to males (Takahashi et al., 2002; Takimoto et al., 2000) and the most popular reason for losing weight is to wear favourite clothes (Takimoto et al., 2000). These social influences may be further endorsed through the media with the promotion of thin "ideal" images. It is possible that these factors contributed to the huge discrepancy between Japanese females' body perception. Furthermore, it has been reported that Japanese have a lower self-confidence when compared with Caucasians (Kagawa, Uchida, Uenishi, Binns, & Hills, in Press; Lerner, Iwasaki, Chihara, & Sorell, 1980). Together with the social and cultural factors mentioned above, this psychological construct may also contribute to an overestimation of one's "heaviness" and "fatness" in Japanese, particularly females.

The current study showed that a greater proportion of Japanese females were trying to maintain or achieve their perceived "ideal" weight compared to males. However many females focused on diet to achieve their goal and only a few participated in regular physical activity compared to males. This finding is also consistent with previous studies (Patton et al., 1997; Serdula et al., 1993) and may indicate a possible increase in %BF in young Japanese

females without them experiencing a distinct increase in weight. Loss of muscle mass is a common outcome in weight management approaches that do not include appropriate physical exercise (Kajioka et al., 2002). A strong concern regarding “heaviness” and “fatness” that does not match or reflect actual body status may predispose Japanese females to increased health risks.

In order to improve one’s body perception of physique, a concentrated effort is required in the promotion of health information through education and the media. This should include information regarding appropriate BMI and body fat levels consistent with good health. It is also important that such health promotion strategies be undertaken in collaboration with the food and fashion industries given the strong impact both industries have on the structuring of “ideal” body image in the general public. Most importantly, the promotion of a healthy body image that reflects actual body status is critical, not only in young adults, but also in school children and adolescents. Health promotion and related strategies are recommended for both males and females as both genders reported poor understanding of actual “fatness” level.

In summary, it is important to highlight the limitations of the current study. Participants were recruited from two different prefectures and despite the close proximity of both recruitment sites to metropolitan areas and the apparent representativeness of the study population based on the results, a difference in location may have influenced the outcome. In order to determine the impact of demographic differences, it is recommended that future research be conducted with larger samples recruited from the same location and also from rural areas. Further, as participants were not randomly selected from the wider population there may have been volunteer bias. This may have contributed to a greater correlation in perceived height and weight if participants had a greater interest in their body compared to others. Because of a relatively small sample size the current study was unable to stratify and

compare body perceptions according to BMI and age. In addition, the current study used %BF estimated from anthropometry. In order to determine more precise and accurate body composition values, future studies should consider the use of more advanced methods such as dual energy x-ray absorptiometry or air plethysmography.

Conclusion

This study determined the body perceptions of young Japanese males and females regarding “heaviness’ and “fatness” in relation to their own BMI and %BF calculated using detailed anthropometry. Both genders had a good understanding of their current weight but Japanese females had a poorer appreciation of body perceptions than males. The study also showed the likelihood that young Japanese females are more likely than their male counterparts to achieve or maintain their perceived “ideal” weight through dietary restriction. This may increase the risk of becoming obese without gaining weight (ie., an increase in %BF due to a loss of muscle mass) in this specific group. Poor body perceptions may be derived from an inappropriate “ideal” body image and such an emphasis on thin visual appearance together with inappropriate weight management practices may substantially increase health risks in Japanese females. In order to prevent unnecessary health risks in young Japanese, particularly females, further promotion of “healthy” body image is recommended.

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Tables

Table 1. Physical characteristics of participants determined from anthropometry

	JM (*n* = 84)	JF (*n* = 139)	*p*-values
	Mean ± *SD*	Mean ± *SD*	
Age (years)	20.5 ± 1.7	20.4 ± 1.3	0.69
Height (cm)	172.9 ± 5.4	158.8 ± 5.0*	<0.01
Weight (kg)	64.0 ± 9.1	52.5 ± 6.1*	<0.01
BMI (kg/m^2)	21.4 ± 2.8	20.8 ± 2.2	0.08
Percentage body fat (%)	16.5 ± 5.1	27.8 ± 4.6*	<0.01
Sum of eight skinfolds (mm)	79.6 ± 37.9	124.5 ± 35.5*	<0.01
Height-corrected sum of skinfolds (mm)	78.3 ± 36.7	133.5 ± 38.3*	<0.01
Trying to maintain ideal weight (Yes in %)	39	60*	<0.01
Aware of the amount/content of the meal (Yes in %)	38	79*	<0.01
Participate in vigorous physical activity/week (%)	86	33*	<0.01

* JF results significantly different from JM results at the 0.05 level.

JM = Japanese males, JF = Japanese females

Table 2. Perceived height and body mass of the study groups and difference from their perceived values

	JM (*n* = 84)	**JF (*n* = 139)**
	Mean ± *SD*	**Mean ± *SD***
Perceived height (cm)	172.8 ± 5.4	158.6 ± 5.4*
Perceived weight (kg)	64.4 ± 9.2	52.7 ± 5.7*
Ideal weight (kg) #	64.6 ± 6.0	48.5 ± 3.9*
BMI (perceived) (kg/m^2)	21.5 ± 2.8	21.0 ± 2.2
BMI (ideal) (kg/m^2) #	21.6 ± 1.5	19.2 ± 1.2*
	Mean ± 95%CI	**Mean ± 95%CI**
Difference (measured-perceived height) (cm)	0.11± 0.2	0.26 ± 0.4
Intraclass correlation (measured-perceived height)	0.99	0.90
Difference (measured-perceived weight) (kg)	-0.35 ± 0.3†	-0.24 ± 0.2
Intraclass correlation (measured-perceived weight)	0.99	0.97
Difference (ideal-perceived weight) (kg) #	0.27 ± 1.4	-4.20 ± 0.6*
Difference (measured-ideal weight) (kg) #	-0.62 ± 1.4	3.95 ± 0.7*
Difference (perceived-ideal BMI) (kg/m^2) #	-0.06 ± 0.5	1.76 ± 0.3*

* Significantly different from the JM at the 0.05 level using independent t-test.

† Significantly different between the measured and perceived values using paired t-test.

One female participant left “ideal weight” blank and therefore number for females was 138.

Table 3. Body perceptions in relation to the BMI and %BF obtained from anthropometry.

		Japanese Males			**Japanese Females**		
		Perceived heaviness			**Perceived heaviness**		
		Light	Average	Heavy	Light	Average	Heavy
Actual BMI category*	Light	9 (100.0)	0 (0.0)	0 (0.0)	12 (57.1)	8 (38.1)	1 (4.8)
	Average	23 (41.1)	25 (42.9)	9 (16.1)	10 (10.5)	29 (30.5)	56 (58.9)
	Heavy	0 (0.0)	0 (0.0)	18 (100.0)	0 (0.0)	1 (4.3)	22 (95.7)
Weighted Kappa† (Value ± 95%CI)		0.53 ± 0.12			0.31 ± 0.10		
		Perceived fatness			**Perceived fatness**		
		Less fat	Average	Fat	Less fat	Average	Fat
Actual %BF category**	Less fat	3 (100.0)	0 (0.0)	0 (0.0)	4 (33.3)	7 (58.3)	1 (8.3)
	Average	24 (40.0)	25 (41.7)	11 (18.3)	2 (2.4)	30 (36.6)	50 (61.0)
	Fat	0 (0.0)	4 (22.2)	14 (77.8)	0 (0.0)	6 (13.3)	39 (86.7)
Weighted Kappa† (Value ± 95%CI)		0.35 ± 0.13			0.29 ± 0.12		

* Numbers of participants included in the analysis for "heaviness" were JM = 84 and JF = 139. The BMI with the WPRO classification was used as an indicator of "heaviness". Figures are the actual number of participants in each category. Figures in brackets are proportion (%) of individuals relative to the actual BMI classifications.

** Numbers of participants included in the analysis for “fatness” were JM = 81 and JF = 139. Percent body fat (%BF) was used as an indicator of “fatness”. Classifications of underweight, average, and overweight for males were < 10%, 10-20%, and > 20% for males and < 20%, 20-30%, and > 30% for females. Figures are the actual number of participants in each category. Figures in brackets are proportion (%) of individuals relative to the actual %BF classifications.

† Kappa values between 0.21-0.40 indicate fair agreement and between 0.41-0.60 indicate moderate agreement.